ABSTRACT OF THE DISCLOSURE

Large area, uniformly low dislocation density single crystal III-V nitride material, e.g., gallium nitride having a large area of greater than 15 cm^2, a thickness of at least 1 mm, an average dislocation density not exceeding 5E5 cm^{-2}, and a dislocation density standard deviation ratio of less than 25%. Such material can be formed on a substrate by a process including (i) a first phase of growing the III-V nitride material on the substrate under pitted growth conditions, e.g., forming pits over at least 50% of the growth surface of the III-V nitride material, wherein the pit density on the growth surface is at least 10^2 pits/cm^2 of the growth surface, and (ii) a second phase of growing the III-V nitride material under pit-filling conditions.